CLAIMS

What is claimed is:

1. A packaged electronic device, comprising:

a substrate on which is positioned an integrated circuit; and

a nano-particle material positioned adjacent to the integrated circuit.

2. The device of claim 1, wherein the nano-particle material forms a layer that contacts the integrated circuit.

3. The device of claim 1, further comprising:

a polymer packaging layer that contacts the integrated circuit.

4. The device of claim 3, wherein the nano-particle material is incorporated into the packaging layer.

5. The device of claim 3, wherein the packaging layer is positioned between the integrated circuit and the nano-particle material.

6. A method of forming an electronic device, the method comprising:

manufacturing an integrated circuit on a substrate; and

positioning a nano-particle material adjacent to the integrated circuit.

7. The method of claim 6, wherein the positioning step comprises positioning the nano-particle material in a manner that substantially prevents moisture from interacting with the integrated circuit.

8. The method of claim 6, further comprising:

covering the integrated circuit with a polymeric layer.

9. An optical device, comprising:

an enclosure with an opening;

a photonic device positioned within the enclosure;

a lid positioned to cover the opening; and

a nano-particle material positioned between the lid and the enclosure.

10. The optical device of claim 9, wherein the photonic device comprises a laser.

11. The optical device of claim 9, wherein the nano-particle material provides a hermetic seal between the enclosure and the lid.

12. The optical device of claim 11, wherein the nano-particle material allows for relative motion between the lid and cover while maintaining the hermetic seal.

13. The optical device of claim 9, wherein the nano-particle material comprises a material with a low Young's Modulus.

14. The optical device of claim 9, wherein the enclosure and the lid are portions of a photonics butterfly package.

15. A method of making an optical device, the method comprising:

positioning a photonic device in an enclosure that includes an opening;

placing a lid on the opening; and

using a nano-particle material form a hermetic seal between the lid and the enclosure.

16. The method of claim 15, further comprising:

designing the nano-particle material to allow for relative motion between the lid and enclosure without breaking the hermetic seal.

17. The method of claim 16, further comprising:

designing the nano-particle material to remove moisture from between the lid and enclosure.

18. A micro-fabricated structure, comprising:

a substrate having a first surface;

a micro-fabricated device positioned on the first surface of the substrate;

an intermediate layer with a first surface and a second surface, wherein the first surface of the intermediate layer is opposite the second surface of the intermediate layer, wherein the first surface of the intermediate layer is positioned adjacent to the first surface of the substrate, and wherein the intermediate layer substantially surrounds the device;

a cover positioned adjacent to the second surface of the intermediate layer; and

a first nano-particle material layer positioned between the cover and the second surface of the intermediate layer.

19. The micro-fabricated structure of claim 18, wherein the first nano-particle material layer forms a hermetic seal between the cover and the intermediate layer.

20. The micro-fabricated structure of claim 19, wherein the first nano-particle material layer is capable of absorbing moisture from surfaces which the first nano-particle material layer contacts.

21. The micro-fabricated structure of claim 18, wherein the first nano-particle material layer has a thickness of less than approximately 10 microns.

22. The micro-fabricated structure of claim 21, wherein the first nano-particle material layer has a thickness of approximately 1 micron.

23. The micro-fabricated structure of claim 18, further comprising:

a second nano-particle layer positioned between the substrate and the first surface of the intermediate layer.

24. The micro-fabricated structure of claim 23, wherein the second nano-particle layer forms a hermetic seal between the cover and the intermediate layer.

25. The micro-fabricated structure of claim 24, wherein the second nano-particle material layer is capable of absorbing moisture from surfaces which the second nano-particle material layer contacts.

26. The micro-fabricated structure of claim 23, wherein the second nano-particle material layer has a thickness of less than approximately 10 microns.

27. The micro-fabricated structure of claim 26, wherein the second nano-particle material layer has a thickness of approximately 1 micron.

28. The micro-fabricated structure of claim 18, wherein the substrate comprises a ceramic material.

29. The micro-fabricated structure of claim 18, wherein the substrate comprises an optically transparent material.

30. The micro-fabricated structure of claim 18, wherein the cover comprises an optically transparent material.

31. The micro-fabricated structure of claim 18, wherein the intermediate layer comprises an optically transparent material.

32. The micro-fabricated structure of claim 18, wherein the device is capable of light-emission.

33. The micro-machined structure of claim 18, wherein the device comprises at least one moving portion.

34. A method of forming a micro-fabricated structure, the method comprising:

micro-fabricating a device on a substrate that structurally supports the device, an intermediate layer that substantially surrounds the device, and a cover that is positioned adjacent to the intermediate layer; and

hermetically sealing the device between the substrate, the intermediate layer, and the cover.

35. The method of claim 34, wherein the hermetically sealing step comprises using a first nano-particle material layer to attach the cover to the intermediate layer.

36. The method of claim 34, wherein the hermetically sealing step comprises using a second nano-particle material layer to attach the intermediate layer to the substrate.

37. The method of claim 34, wherein the micro-fabricating step comprises micro-fabricating the device to have a movable portion.

38. The method of claim 34, wherein the micro-fabricating step comprises micro-fabricating the device to have light-emission capabilities.

39. An optical fiber, comprising:

a core; and

a hermetic seal around the core, wherein the hermetic seal includes a nano-particle material.

40. An optical fiber, comprising:

a core;

a cladding around the core;

a protective layer around the cladding; and

an overcladding bearing layer, positioned between the cladding and the protective layer, wherein the bearing layer includes a nano-particle material

and allows for the protective layer to slide with respect to the cladding without experiencing plastic deformation.

41. A method of protecting a macroscopic structure, comprising:

preparing a nano-particle material; and

forming a nano-particle material layer by depositing the nano-particle material on a surface of the macroscopic structure.

42. The method of claim 41, wherein the forming step comprises forming the layer on the surface of one of a tube, a pipe, a car, a bridge, a building, an aircraft, an aerospace structure, a marine vehicle, an underground structure, and an ocean structure.

43. The method of claim 41, wherein the forming step comprises forming the layer on the surface of one of a cardboard package and a plastic package.

44. The method of claim 43, wherein the forming step comprises forming a temporary layer that is capable of being washed off.